Divergent Paths of Actors and Policy Learning: A Comparative Study of the Oil Palm Systems of Innovation in Malaysia and Nigeria

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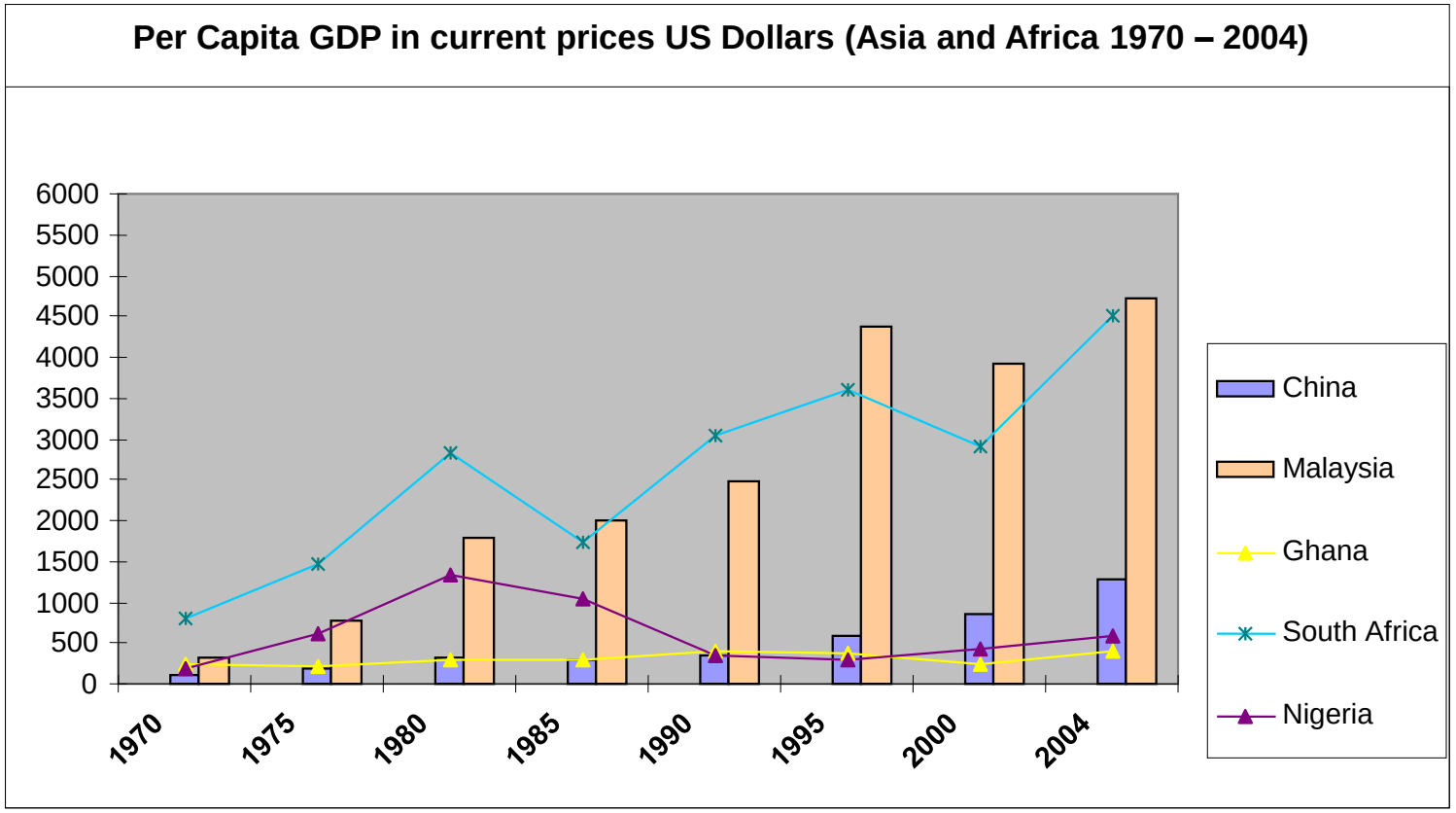
Outline

- Background/Introduction
  - Why Oil Palm?
  - Why Malaysia and Nigeria?
  - Research Objective and Proposition
- Theoretical Literature
- Methods
- Preliminary Findings
- Conclusions

Background/Introduction

- The study focuses on the processes and institutions involved in what has been framed as the *economic catch up process*.
- What processes and institutions fostered, the rapid progress made by countries in South East Asia, and
- Why and how did Sub-Saharan Africa (SSA) fall so far behind?

Background/Introduction



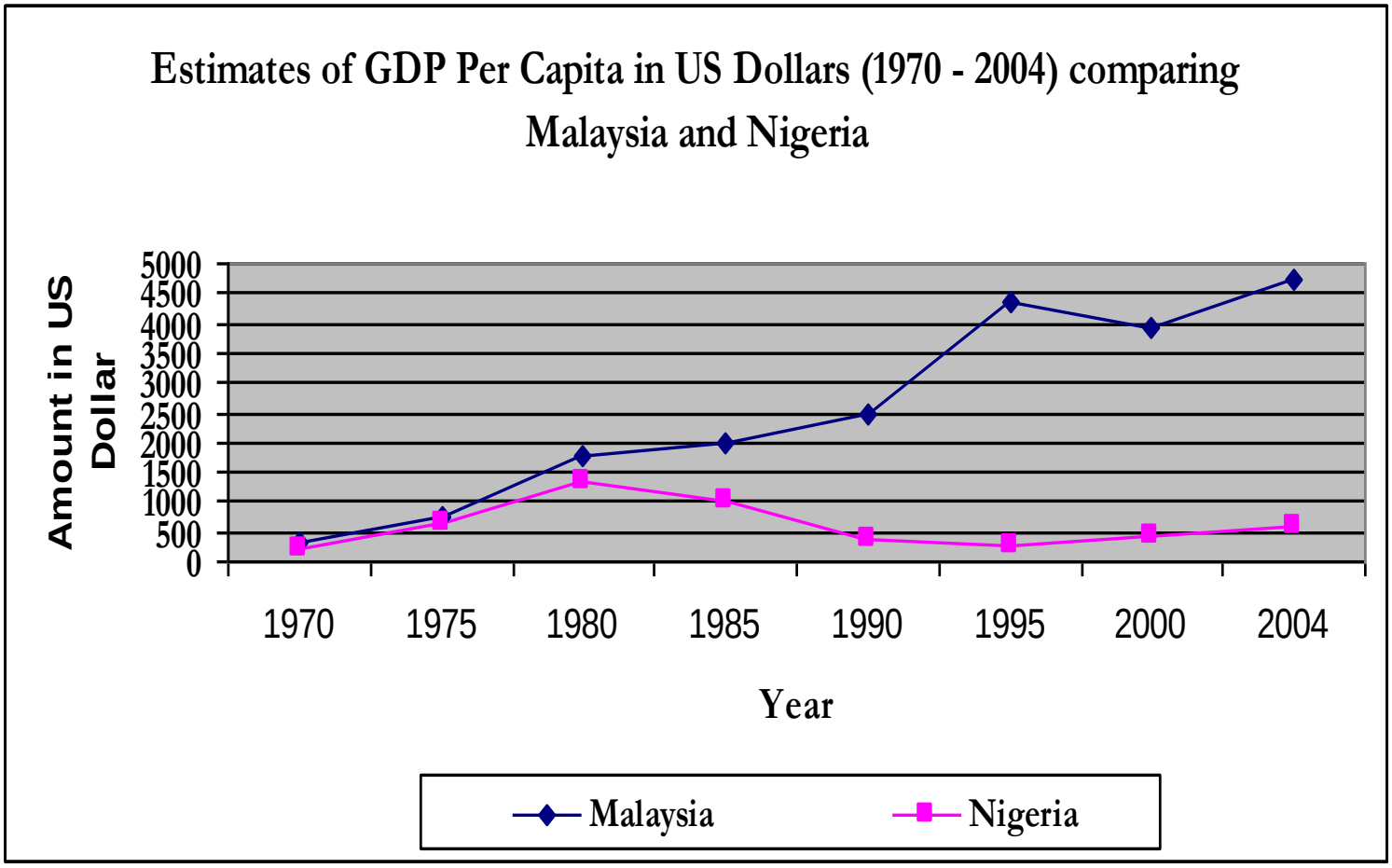
Background/Introduction

- Fifty years ago the two regions and the two tropical countries under study were rural peasantries with low living standards.

- On the one hand one set of countries have advanced into export-oriented manufacturing industries with a strong base of technological capabilities while the other has remained largely agrarian societies with low technological capabilities across most sectors (Lall and Pietrobelli 2002).

- In the export of what was Africa's comparative advantage much ground has now been lost to Asia in the export of traditional African agricultural products like palm oil, coffee and cocoa (Oyelaran-Oyeyinka, 2006).

Why Malaysia and Nigeria?



Sector: Oil Palm Industry

- Oil Palm is indigenous to Africa but a borrowed technology to Asia. It is the highest Oil yielding tree crop having the following products and uses:

	Product	Properties
Food Products	Margarine	Very rich in Vitamin A and E
	Palm oil for food	
	Salad dressings	
	Mayonnaise	
Health Products	Supplement in Vit. A deficient Children	Vitamin A
	Anti aging	Vitamin E
	Anti cancer	Anti oxidant
Industrial Products	Soaps	Better foaming
		Perfume retention abilities
	Candles	Burns longer
		Drips & smoke less compared to wax paraffin candles
	Cosmetics	Moisturising
	Toothpaste	Softener
	Fertilisers	Biomass
	Animal feed	- do -
	Power generation	
	Energy	
Latest Development	Replacement of petrol and diesel in automotive industry. Has been tested in Malaysia.	Palm based methyl esters are '***green fuel***'. It doesn't pollute the environment. No carbon

Sector: Oil Palm Industry in Malaysia

- Malaysia: often viewed as a country that evolved from dependence on tin and rubber to export-oriented manufacturing dominated by electronics assembly. But the commodity that took the country to the technological frontier is palm oil. Oil palm is now a major pillar of Malaysia's industrialization.

- Malaysia overtook Nigeria as the world's leading exporter and producer of palm oil in 1966 and 1971 respectively (Gopal 2001).

- Malaysia now accounts for about half of the world production of palm oil and has evolved from simple cultivation and crude oil processing to become the industry's leading innovator, controlling the industry's value-added chain.

Sector: Oil Palm Industry

- Nigeria was the largest producers and exporter until 1966 and 1971
- There has been an annual increase of 2.5% in production, but Nigeria is no longer at the forefront of oil palm & products export
- The initial stagnation has been blamed on lack of government policies and other issues pertaining to new interest (crude oil boom). However the ffg probes the mind:
  - How was Malaysia able to build a successful Oil Palm industry?
  - Why have Malaysian companies become major players in the global stage?
  - Why has the industry in the two countries followed different paths?

Research Philosophy

- The central proposition of this thesis is that the divergent paths of sectoral development have been defined by differences in institutional, policy and technological trajectories;

- And it is about the nature of differentiated development examined from sectoral innovation system, historical and technological perspectives

Research Questions

- What are the roles of institutions, organizations and policy in the development of the oil palm industry in the two countries?
- How do these factors converge with science and technological instruments that the two countries adopted?
- What are the nature and characteristics of the sectoral systems of innovation that support the development of the sector?

Research Questions

- What specific role did the two governments play in terms of sector policies?
- What microeconomic policies underline the interactive learning, technological capabilities driving the sector?
- What is the specific role of new technologies, and how do technological knowledge infrastructure promotes separate national development?

Specific Objectives

- Systematically investigate the co-evolution of institutions, policies and technologies that are determinants of the uneven development of the oil palm and processing sectors in Nigeria and Malaysia;
- Examine the nature and capability of actors and compare these in the oil palm industry of the two countries;
- Examine the types, levels and intensity of interaction between the actors in the oil palm industry;
- Systematically examine the scientific and technological infrastructure in Malaysia and Nigeria and how these affect innovation and performance of the oil palm sector.

Research Propositions

The propositions guiding the research:

- **P1**. The observed divergence in the sectoral development of the palm oil industry in the two countries is a result of different institutional, organizational and policy settings. (Combined with **P2** in **Chapter 3**)
- **P2**: The nature and capability (human capital) of actors (organizations and industrial firms) will determine the speed and trajectory of development of industry in the two countries.
- **P3: Interactive Learning** among firms is a major source of growth and innovation performance of the sector (Review in chapter 2 and Empirical findings in **Chapter 4**).
- **P4 Innovation and Production Performance** is determined by a wide array of policy, technological and human capital factors (Empirical findings and Case Study in **Chapter 5**)
- **P5: The capacity of scientific and technological infrastructure** as well as the nature of science and technology applied over time will condition the evolution and performance of the sectors (**Chapter 6**)

Theoretical Literature

- Literature on ***technological capabilities*** broadly and in latecomer context (Dosi, Nelson et al. 1997, Bell and Pavitt, 1993, 1995)

- Second, we examine the ***systems of innovation framework*** and how systems differ in different contexts (Freeman 1987; Lundvall 1992; Edquist and Johnson 1997).

  Innovation Systems bothers on the following
  - Actor centred approach i.e identify key actors
  - Interactive approach which guides policy makers
  - Institutionally noted- it operates within a context
  - Historical path dependent approach

- The third broad perspective is the ***nature of institutions*** and how it underpins innovation systems, as well as the dynamics of national and global integration through global value chains (GVCs) North (1996).
  - This theory helps to relate national actions with global dynamism or lack thereof of firms particularly as the oil palm in Malaysia has become a highly global sector while the one in Nigeria is largely oriented to the domestic market.

Methodology Framework Model: BOLADALE ABIOLA ADEBOWALE 2006

BACKGROUND

Nigeria:

. Gaps in capability
. Lack of required huge capital
. Lost ground as largest exporter
. Inability to meet domestic and global demands
. Lack of incentives: R&D funding; land tenure …
. Inconsistent government policies
. Low level of technology development

Malaysia:

.Breaking new grounds in techn
. World leading producer &exporter

THE NATIONAL SYSTEM

Malaysia

S E C T O R: The Oil Palm Industry

Nigeria

Innovation

Science, Technology & Innovation Support System

SYSTEM ACTORS

. . Government Bodies
. Universities
. Industries
. Research Institutes (Public & Private)
. Financial Institutions
. Farmers

THE VALUE CHAIN PROCESS

UPSTRE AM ⇒ ⇒ ⇒ ⇒ DOWNSTREAM

Oil Palm Cultivation
. Semi/ wild groves
. Estate
Scale: Small, Med & Large

Milling: - Crude Palm Oil
Kernel oil extraction
Palm Kernel cake

PROCESSING →

Refining & Fractionation
- Processes oils & By-Products
=>(Oleo chemical Industry, Speciality Fats, Consumer Oils & Fats

MARKETS
. Domestic
. Export

Intervening Variables
. Climate
. IPR
. Political factors
. Tariffs (export & import)
. Domestic demands

Independent Variables of the System

Learning Capabilities & Competence
. Age & size of economic actor
. Years of experience
. Infrastructure
. R&D funding
. Human skills
. Access to current journal
.Access to physical tools, chem.
. Access to funds (R&D incentives)

Collaborative Interaction
. Joint research
. Joint training
. Exchange of Personnel
. Co- authorship
. Linkage between firm & Supplier
. University & Industry linkage
. PRI & firm
. Involvement with Cooperatives

Performance
. Technical skills
. Infrastructure (land, water
. Access to investment
. Access to Information
. Working capital
. Access to inputs materials Such as fertilizers, pesticide

STI Support System
. Advances in techniques (TC, Genetic Imprvt, DNA…)
. Access to state of art equipments
. Disease resistance
. Pest resistance

Study Area

- **Malaysia**
  - Located in the Southeastern Asia
  - Population: over 21 million people
  - Total land mass of 329, 750 sq. km.
  - Climate is tropical with a heavy annual rainfall of 2500mm.
  - Areas covered: Sabah, Sarawak and Peninsular Malaysia (7 states)
- **Nigeria**
  - Located on the West coast of the African continent
  - Population: about 140 million people
  - Total Land mass of 923,768 sq.km
  - Climate is tropical with average annual rainfall of 1,250-1,500 mm much of the west and centre of Nigeria.

Research Design

- Multi-method approach & different sources of data were used for this study and these include:
- Primary data (large-scale survey studies using questionnaires to establish the context)
- Secondary data: (previous studies along with official reports and documents), and
- Case studies (of firms, organizations, institutions, products and processes)

	Nigeria	**Malaysia**
Small & Medium Scale Farmers	346 Qs Admin & Retrieved **NB: 10% of farmers population in the areas surveyed**	Data partly from Malaysian Agricultural Census Board
Large Estate	**Q:** 15 Admin & 12 Retrieved **C: i)**Presco Plc **ii)** Okumu Oil & Mills **Sec Data**	Data partly from Malaysian Agricultural Census Board **C: Sime Darby** **Sec Data**
Research Organizations / Regulatory Bodies	**C:** NIFOR	**C:** MPOB (PORIM & PORLA)

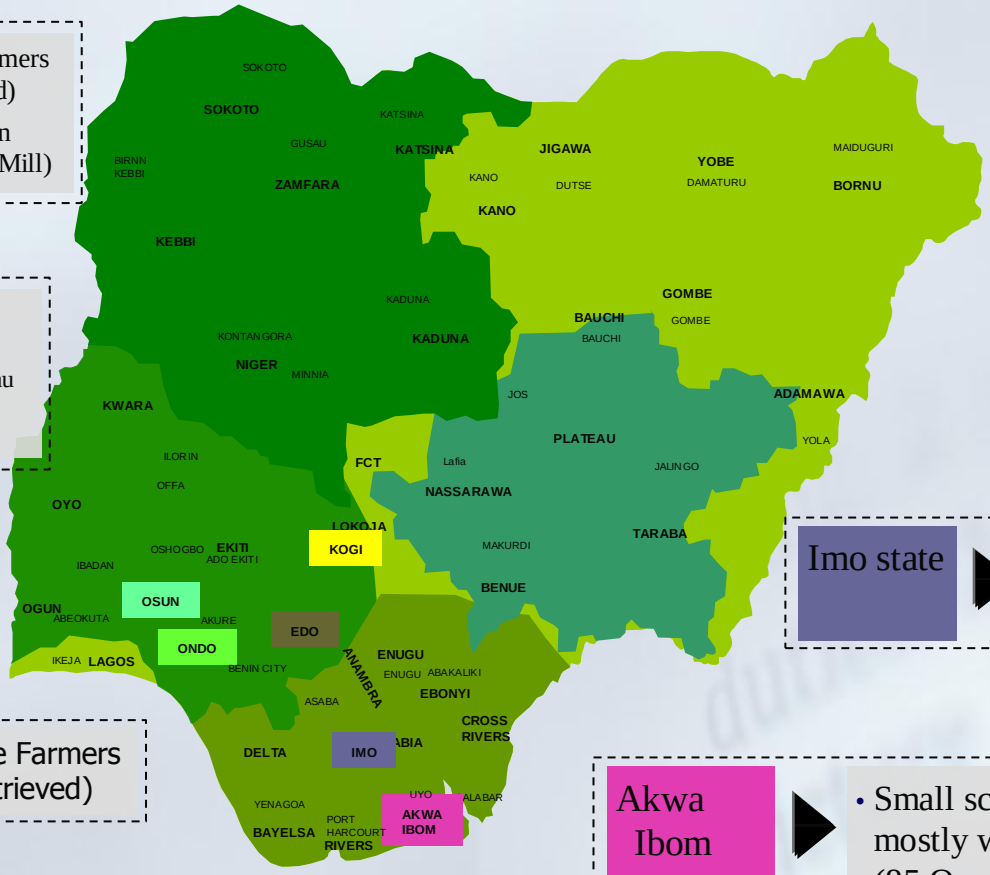
Sample Area of Questionnaire Survey of Farmers, Refiners & Case Study Interview

Ondo state
- Small scale Farmers (92 Qs retrieved)
- Large Plantation (Okitipupa Oil Mill)

Edo state
- Small scale Farmers
- Large Plantations (Presco Plc & Okumu Oil Mills)
- NIFOR

Kogi state
- Small scale Farmers (43 Qs Retrieved)

Osun state
- Small scale Farmers (61 Qs Retrieved)



Imo state
- Small scale farmers mostly wild groves (67 Qs retrieved)

Akwa Ibom
- Small scale farmers mostly wild groves (85 Qs retrieved)

Research Findings (Partial)

	Malaysia	Nigeria
Firms (Holding)	Highly consolidated Category I,II,III	Not organized Mostly small scale (60% wild grove) small, medium & large
Nature of Actors	Estates (Largest plantation is 335,536 Ha)	Small in size (Firm with largest planted mature area is 10,684 Ha)
Total Hectarage	4,165,000 Ha (as at Jan 2007)	2,514,090 Ha
Nature of Market Orientation	Global Market Leader	Domestic

Research Findings (Partial)

Comparing Key issues in Malaysia and Nigeria

The parameters that are used include:

- **Investment in research and development**
  - Malaysia's average spending per scientist grew from $175,000 in 1981 to $344,000 in 2002 and as at 2007 the figure has moved up to $500,000.
  - Nigeria has the largest number of FTE researchers in Africa (11% of the region's total), its spending at only 7%.

Malaysia: targets research areas under the scheme called Intensification of Research in Priority Area (IRPA)

Nigeria: conducts a large part of agricultural research – expectedly and as with much of other African countries, there is little research capacity in the private sector. Given the NIFOR case study, only 4% of the approved budget of the institute was released for a period spanning 10years. Even then, the sum of money released is only a fraction of the ideal funding requirement (total $1,450,000). And for the period between 1992 to 2002, no fund was released for R&D.

Research Findings (Partial)

Comparing Key issues in Malaysia and Nigeria

Trend in the source of funding amongst the small scale farmers in Nigeria 2002-2007

Source	2002	2003	2004	2005	2006	2007
Government	0.9	0.6	0.9	0.3	0.6	n.a
Family	14.2	15.3	14.5	14.7	13.9	n.a
Self Generated	73.1	74.9	76.3	76.6	78.6	16.5
Bank	1.4	0.9	1.2	0.9	1.4	0.6
Cooperative/ Association	14.5	13.0	14.7	14.2	14.7	5.2
Other Sources	4.3	4.9	4.3	4.6	4.3	2.6

Source: Nigeria- Author's Survey 2007

In Malaysia, the highest percentage of farmers and large firms claim to have sought funding assistance from the banks mostly through the government intervention because of the policies and incentives.

Research Findings (Partial)

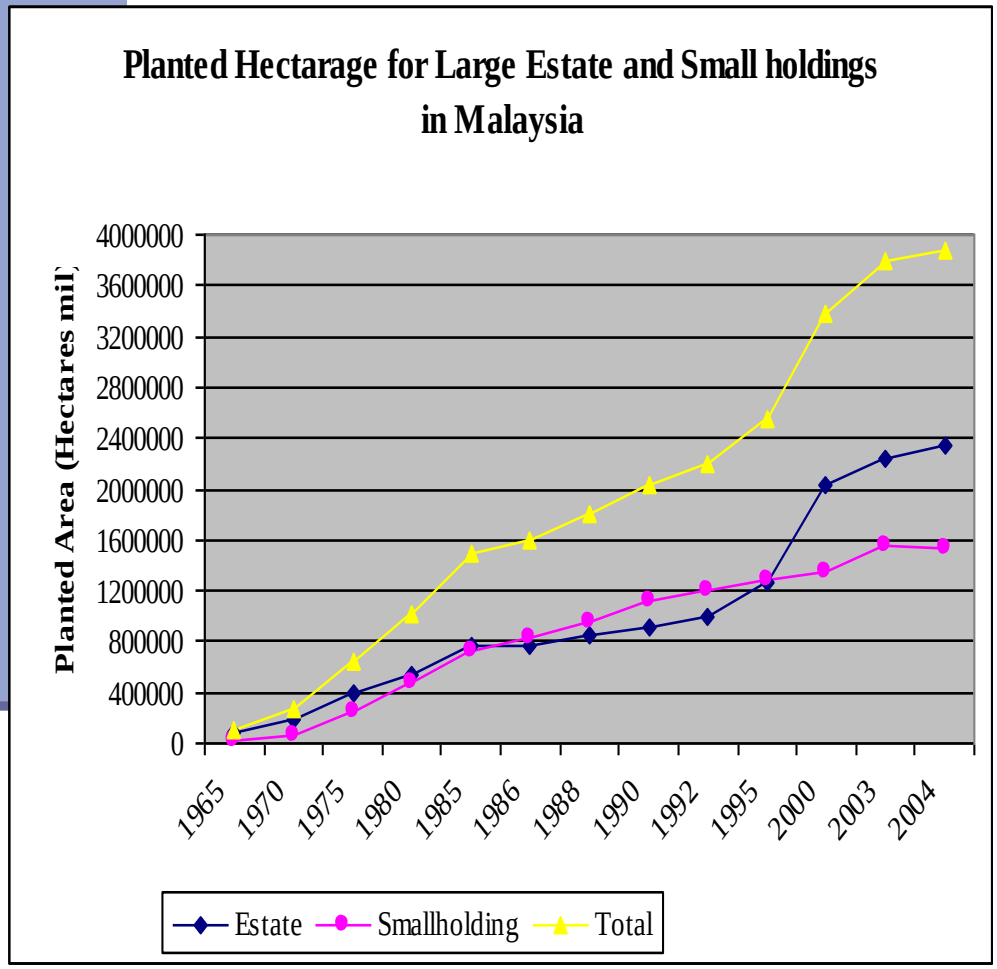
Comparing Key issues in Malaysia and Nigeria

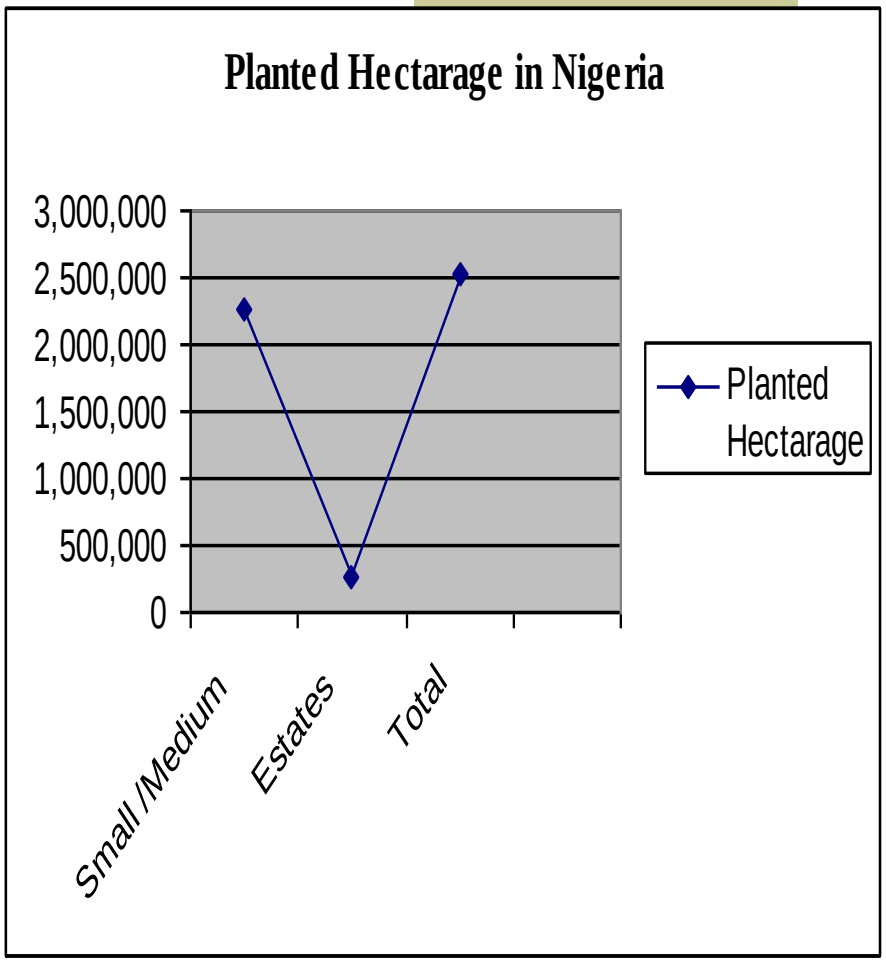
- **Ownership and farm size**
  - In Malaysia's oil palm industry: Preponderance of large estate farms compared with Nigeria which is dominated by small scale farmers.
  - Large estate farms are normally associated with higher productivity, better technology and thrive on substantial investment.

Farm Ownership	Nigeria (%)	Malaysia (%)
Self/Private	75.7	53.7
Employer/ Government	17.2	45.4
Family	6.2	0.9
Community	0.6	-
On Lease	0.3	-

Research Findings (Partial)

Comparing Key issues in Malaysia and Nigeria





Source: Nigeria- Author's Survey 2007

Research Findings (Partial)

Comparing Key issues in Malaysia and Nigeria

- **Educational level of Actors**

i) Farmers

Type	Malaysia (%)	Nigeria (%)
No Education	34.2	8.7
Primary	43.9	38.6
Secondary	20.3	26.2
Post secondary	0.8	8.4
Tertiary	0.8	18.1

ii) R&D Personnel

Educational Level	Scientists (NIFOR, Nigeria)
Ph.D	25 (43.85%)
M.Sc	22 (38.6%)
B.Sc	10 (17.54%)
Total	**57 (100)**

Malaysia (MPOB)

25 % of Scientists with PhD

302 Technologies/Products (5 prods in NIFOR)

Filed 200 patents (No patents in NIFOR)

30% of patents sold & commercialized

Sources: Malaysia (2005) Agricultural Census; Nigeria: Author's survey 2007

Research Findings (Partial)

Comparing Key issues in Malaysia and Nigeria

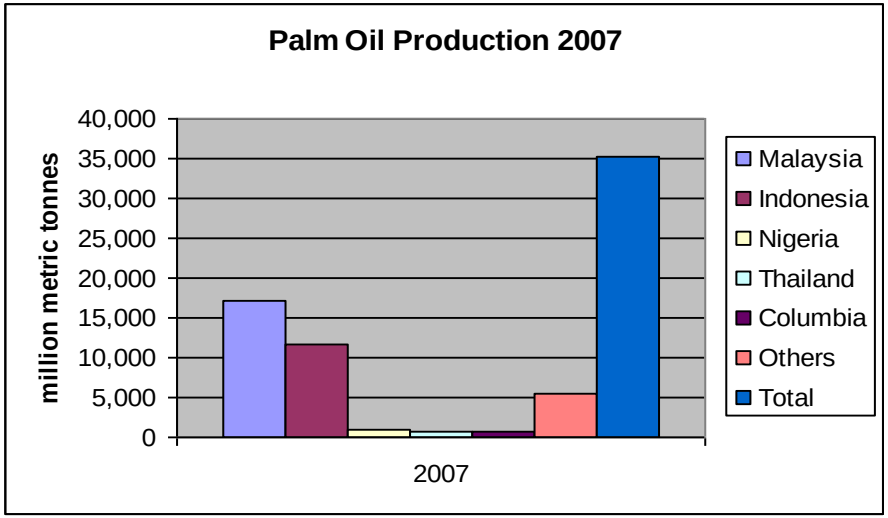
- **Production and Export Orientation**
  - Parallel with the increase in oil palm areas, production and exports of palm oil and palm oil products also increased.
  - From a share of only 7.7 per cent of agricultural exports in 1970, palm oil exports now accounted for about 30 per cent of all agricultural exports.

Malaysia

- Almost half of World Palm Oil exports (49%)
- Leading commodity export, surpassing petroleum export

Nigeria

- Zero Export. All domestic market



Research Findings (Partial)

Comparing Key issues in Malaysia and Nigeria

Total Output from Oil Palm Plantation (amongst respondents) in Nigeria

Tonnes (FFB)	2002	2003	2004	2005	2006
< 100	93.4	93.7	94.0	93.1	91.7
100 – 299	4.4	3.0	3.0	3.0	3.6
300 – 499	1.1	2.1	2.0	3.9	3.6
500 – 799	-	1.2	1.0	-	-
> 800	1.1	-		1.0	-
Litres(Palm Oil)	**2002**	**2003**	**2004**	**2005**	**2006**
< 100	90.5	93.7	95.2	87.9	90.6
100 – 299	4.2	3.0	3.4	4.1	4.5
300 – 499	3.5	4.8	3.6	2.6	1.0
500 – 799	-	-	0.6	0.5	1.5
> 800	0.7	-	0.6	0.5	0.5

Source: Nigeria- Author's Survey 2007

Institutional support for the oil palm industry under Industrial Master Plans 1 and 2

Human Resources	Technology	Financing	Physical Infrastructure	Tax & regulatory agencies
IMP (1985 – 95)				
Training Institutes, Universities On- the- job training	Adapted process and R & D technology from PORIM	Equity, own fund, bank, offshore loan and venture capital	Cooking oil, margarine, vanaspati, frying fat. Cocoa butter subst, dough fat, salad oil etc	Government incentives
IMP 2 (1996 – date)				
PORIM-Institutions of higher learning to provide training, esplly on downstream pdts Training of R&D personnel Overseas training	Adaptation, innovation & Developmt to enhance local technology for domestic use & export	Equities, own fund, bank, access to offshore loan and venture capital	Improved onshore pumping facilities, more onshore storage & handling facilities and utilities, particularly in Sabah & Sarawak, to meet growing demand.	Market-coordinated incentives

Policies: Malaysia

- Export-oriented industrialization (EOI) began in 1968 with enactment of the Investment Incentives Act. Oil palm acreage expanded dramatically, in part to settler schemes under the Federal Land Development Authority (FELDA).

- The government's promotion of oil palm was designed to diversify commercial crop production away from rubber,

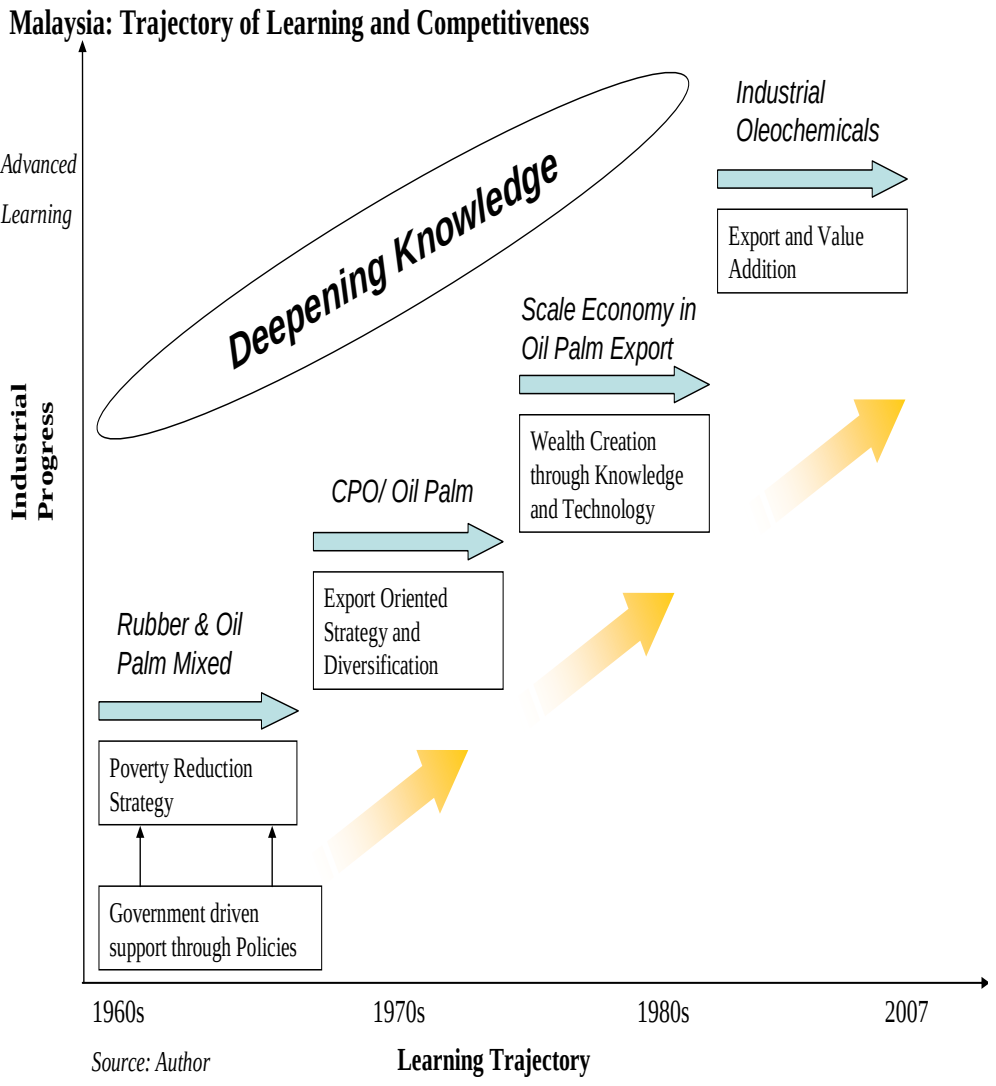
- To contribute to the government's program of economic redistribution and poverty alleviation, expressed in the New Economic Policy (NEP) of 1971

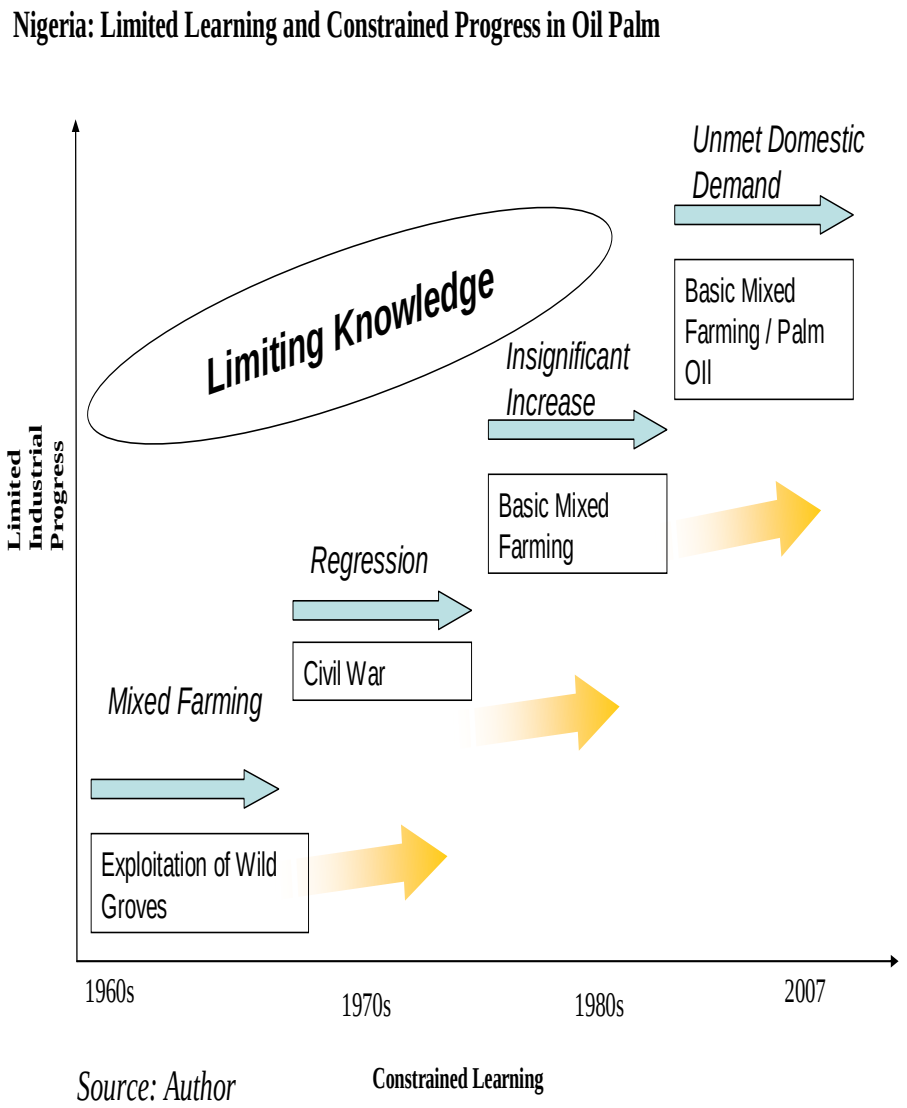
Policies (2)

- The reason for the expansion in the late sixties and early seventies can be almost wholly found in a change in government policy. From 1960 until 1968, a single export duty was applied to all forms of palm oil, regardless of degree of processing.

- The New Biofuel Policy yet to be promulgated

Contrasting Trajectory of Malaysia & Nigeria





In Conclusion

The critical drivers that helped make Malaysia the world's leading exporter of palm oil & related prdts are:

- Policy instruments and institutions that were created to support the industry has been strong and consistent.
- Network connections and coordination among economic agents directly related to the operations of palm oil firms.
- Developments at the firm level (including plantations and smallholdings), where production is carried out.
- Consistent funding and investment in R&D

Thank you for your attention